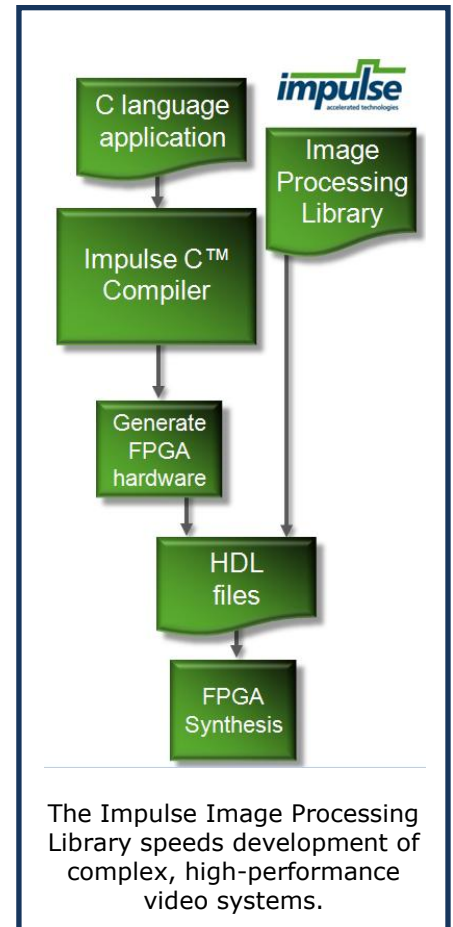


Impulse C™ FPGA Image Processing Library

Block-based design supports rapid generation of efficient, reusable FPGA imaging systems

The Impulse C™ Image Processing Library accelerates your image processing development and reduces project risk. Library components are provided with standard C-language function prototypes allowing them to be easily connected together, and combined with other C code, to create complex image processing systems. These C-callable functions and C-language processes represent optimized image processing filters that are instantiated, through the use of synthesis and place-and-route tools, in the target FPGA.

The Image Processing Library is part of an overall block-based design flow. Block-based design is ideal for image processing, where many of the filters are common and there are standard interfaces between blocks, representing pixel data in a limited number of formats. Impulse provides pre-optimized processing blocks that can be imported and modified to reduce development times while increasing the efficiency of complex image processing projects. The library is royalty free; all of the included elements can be incorporated into your designs with no restrictions or deployment fees.



Key product benefits

- Enables software and hardware engineers to be quickly productive when designing streaming video and imaging applications in FPGAs.
- Provides parallelized, optimized versions of common video filters.
- Generates FPGA design blocks and test benches from ANSI C.
- Improve performance by leveraging pre-optimized functions.
- Reduce risk by reusing known-good code.
- Verifies the functional and timing models of designs before running synthesis.
- Retains compatibility with ANSI C for software-level debugging.
- Generated hardware is in standard HDL formats, ready for synthesis to popular FPGA devices.

Design Flow

1. Combine image processing library blocks with custom C-language filters to create complex image processing algorithms.
2. Integrate library blocks from FPGA manufacturer libraries.
3. Analyze, refactor, compile and iterate to optimize FPGA performance.
4. Verify C code functionally in a desktop environment such as Visual Studio, Eclipse, and GCC-based tools.
5. Export synthesizable VHDL or Verilog to FPGA synthesis and platform tools.

About Impulse C™ and CoDeveloper™

Impulse C allows you accelerate your image and video processing algorithms by taking advantage of FPGA parallelism, without writing low-level HDL. Impulse C is industry-proven for applications in defense, aerospace, medical, industrial and other performance-critical applications. Impulse products and services allow more rapid development of high-performance embedded and streaming video systems using familiar software programming methods.

Impulse CoDeveloper includes the Impulse C software-to-hardware compiler, interactive parallel optimizer, and Platform Support Packages for a wide range of FPGA-based systems. Impulse tools are compatible with all popular FPGA platforms and tools.

Hardware IP blocks from C code

Support for module generation allows hardware IP blocks to be generated from C-language, using named ports and streaming API functions to integrate these blocks with the overall design. Impulse C IP blocks can be easily mixed with Verilog or VHDL, or with IP created using FPGA manufacturers tools. For video applications, the Impulse C API functions can be used to combine multiple streaming C-language processes to create highly pipelined, high-throughput systems.

Rapid prototyping

By working at a higher level of abstraction, you can more quickly generate working prototypes for system testing. This allows you to try dramatically different algorithmic approaches with only minimal changes to the C source code. Experiments that can take hours to accomplish in HDL can take just minutes using Impulse C.

Tools, training and design services

Impulse expert staff members are here to help, providing product support, design consultation and custom development. Impulse tools are intuitive and fit into existing design flows. Contact us to discuss your image processing requirements.

Sample Image Processing Library Filters

ARITHMETIC UNARY OPERATORS

- Logical Negation

ARITHMETIC BINARY OPERATORS

- Image Addition
- Image Subtraction
- Image Multiplication
- Image Division
- Image Differencing
- Logical Operations
- Minimum / Maximum
- Image Blending

CLIPPING

COLOR SPACE CONVERSIONS

- RGB24 to Grayscale
- RGB24 to YCBCR
- Grayscale to Binary
- Binary TO Grayscale
- 24-Bit RGB to 48-Bit RGB
- RGB to Component
- YCBCR to Component
- 8-BIT Grayscale to 16-BIT Grayscale
- Binary to Packed Binary

SCALAR OPERATIONS

- Scalar Addition
- Scalar Subtraction
- Scalar thresholding

CONVOLUTIONS

- 3x3 Convolution
- 5x5 Convolution

MORPHOLOGICAL FUNCTIONS

BINARY EROSION

BINARY DILATION

IMAGE AVERAGING (ALPHA BLENDING)

FRAME BUFFERS

MULTI PORT MEMORY CONTROLLER (MPMC)

GEOMETRIC TRANSFORMATION

SCALING (RESIZING)

ROTATION

TRANSLATION

And more ... contact us for details!

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